

[0042] As shown in **FIGS. 5 and 6**, upper unit **2** can be turned through 180 degrees to the right and left horizontally with respect to lower unit **3** via hinge **6** from a perpendicularly opened state.

[0043] In this embodiment, display **4** can be exposed as shown in **FIG. 6**, even if folding mobile phone **1** is in a folded state. Further, folding mobile phone **1** has an operation input section **7** for operating display **4** in hinge **6**, so that folding mobile phone **1** can be used for playing a game and being easily operated by operation input section **7** even if folding mobile phone **1** is in a folded state.

[0044] The details of hinge **6** and the surrounding area of folding mobile phone **1** are explained below.

[0045] **FIG. 7** is a perspective view of a preferred embodiment showing details of the interior structure of hinge **6** of folding mobile phone **1** according to the present invention.

[0046] In **FIG. 7**, hinge **6** includes a base **100**, a horizontal rotation shaft **101**, which is a first shaft member, and brackets **102** and **103**, which are second shaft members fixed at the right and left of horizontal rotation shaft **101** in the direction perpendicular to horizontal rotation shaft **101**. Base **100**, which is a base portion of hinge **6**, is fixed to lower unit **3**. Horizontal rotation shaft **101** is held by a central portion of base **100** to lower unit **2** so that it can rotate.

[0047] Mount **104** is provided between brackets **102** and **103**. Brackets **102** and **103** are fixed at an upper part of horizontal rotation shaft **101**, and are connected to each other under mount **104**. In the opening and closing shaft direction of bracket **103**, perpendicular opening and closing shaft **105** is provided for operating upper unit **2** so it can be opened and closed. Further, flexible board fixing member **110** is provided for fixing flexible board **106** and bobbin **107** for winding flexible board **106** around horizontal rotation shaft **101**.

[0048] Horizontal rotation shaft **101** is arranged on base **100** so that upper unit **2** is perpendicular to the face of input keys **5** on lower unit **3**, and so that it can be turned in the horizontal plane with respect to the face of input keys **5**.

[0049] Brackets **102** and **103**, which are the opening and closing shaft members at the upper part of horizontal rotation shaft **101**, and perpendicular opening and closing shaft **105** are fixed to upper unit **2**, so that upper unit **2** can be turned horizontally through 180 degrees to the right and left with respect to the face of input keys **5** of lower unit **3** by the rotating operation of horizontal rotation shaft **101**.

[0050] A space for mounting the aforementioned operation input section **7** is provided on the upper face of mount **104**. An input device such as a track ball or a pointing device according to the slide amount of key may be used as operation input section **7**. As the pointing device, for example, a device described in Japanese Patent Application Publication Laid-Open Kokai No. 2001-236351 may be used. However, the pointing device is not limited to the devices described in this publication.

[0051] Mount **104** may be mounted with an audio input device or an audio output device in addition to operation input section **7**. Also, a light emitting element may be mounted on mount **4**. The size of mount **104** is expandable

in the lengthwise direction according to the device to be mounted thereon, by which a space capable of mounting the device can be secured.

[0052] Next, a connecting and attaching method using flexible board **106** for connecting a board of upper unit **2** to a board of lower unit **3** in hinge **6** will be explained. Flexible board **106** extending from a circuit board (not shown) of upper unit **2** is inserted into mount **104** in bracket **102** through a slot provided at an upper part of bracket **102** in a loose state with the flexible board being vertical. Herein, the loose state means the wound state shown in **FIG. 7**. Flexible board **106** passes through bracket **102** and mount **104** and is wound on bobbin **107**. An electrical path is formed by a part of flexible board **106** passing through mount **104** and is electrically connected to operation input section **7**.

[0053] Bobbin **107** is attached to the periphery of horizontal rotation shaft **101** has guide **108** at its upper part. Bobbin **107** does not rotate together with horizontal rotation shaft **101**. Bobbin **107** is fixed to lower unit **3** or base **100**. By winding flexible board **106** on bobbin **107**, flexible board **106** wound around horizontal rotation shaft-**101** can be prevented from shifting in an axial direction.

[0054] Flexible board **106** wound on bobbin **107** is bent through 90 degrees so that it can be connected to a board of lower unit **3**, and a portion bent through 90 degrees is reinforced for high durability by flexible board fixing member **110**, which prevents flexible board **106** from floating. After being fixed by flexible board fixing member **110**, flexible board **106** is connected to a circuit board (not shown) of lower unit **3**.

[0055] **FIG. 8** is an exploded perspective view of a preferred embodiment showing the relationship between hinge **6**, front cover **200** and back cover **201** of upper unit **2** in folding mobile phone **1** according to the present invention. In **FIG. 8**, guide **108** for bobbin **107**, as shown in **FIG. 7**, is omitted to make the figure understandable.

[0056] Front cover **200** and back cover **201** make up upper unit **2**. Front cover engagement portions **202** and **203** are formed separately from each other to connect front cover **200** to hinge **6** at the tip end on the hinge side of front cover **200**. Front cover engagement portion **202** is a cylinder having a substantially half moon shaped cross section, and flexible board **106** is arranged therein. Also, front cover engagement portion **202** is attached so that it can be fitted on a bush in the bracket **102**. Front cover engagement portion **203** is a cylinder without a notch, and perpendicular opening and closing shaft **105** is fixed therein. Perpendicular opening and closing shaft **105**, which is explained below, is inserted from one end of front cover engagement portion **203** from the rear and is fixed in a state in which front cover engagement portions **202** and **203** are connected to each other with brackets **102** and **103** being held therebetween, and is further fixed so that it can be turned with respect to bracket **103**.

[0057] Side cover portion **213**, cover member **212** and front cover engagement portion **202** restrain the movement of flexible board **104**, and side cover **211** covers one end of perpendicular opening and closing shaft **105**.

[0058] **FIG. 9** is an enlarged perspective view of a preferred embodiment showing bracket **102** of a folding mobile phone according to the present invention.